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ABSTRACT

This curriculum guide supports and gives structure to engaging students in writing-to-learn activities in science classes by delineating writing outcomes and assessment. The guide is structured according to the beliefs that students need models, revision is the key to successful writing, writing is a tool for demonstrating learning, and writing is a tool for learning. Among the topics discussed are the reading and writing connection, a writing framework, portfolio development guidelines, a sample portfolio evaluation, rubric assessment strategies, purposes and forms of discourse in science, and instructional strategies. Instructional strategies include lab write-up procedures, expository essay, three-paragraph expository essay, book report format, summarization formats, dialogue journals, pop-up book, riddles, descriptive writing, and business letters. (DDR)

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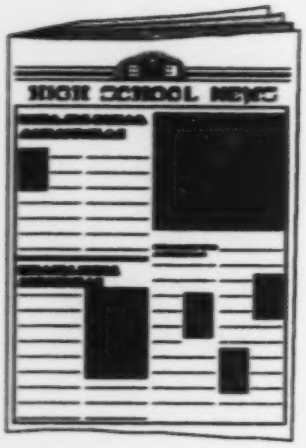
Writing To Learn in Science

A Curriculum Guide



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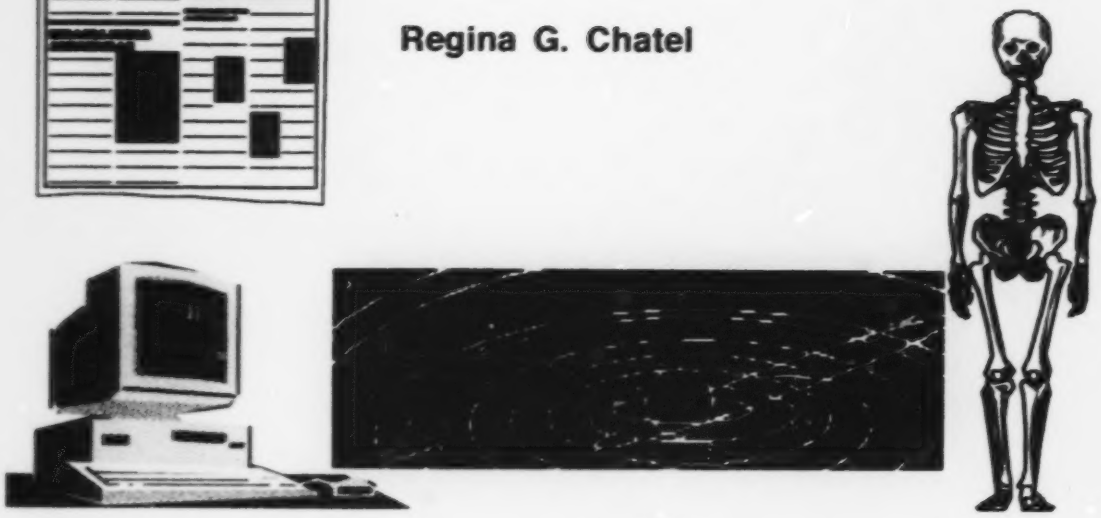

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Writing to Learn in Science

A Curriculum Guide

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1997

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Writing to Learn in Science

Introduction

Students enrolled in the Coventry Science Center will receive one English credit toward graduation. The rational for awarding the English credit is the belief that students engage in many writing activities in their science classes. This curriculum guide gives structure to this commitment in terms of delineating writing outcomes and assessment, and suggesting a variety of instructional writing activities. It must be remembered that this is a four year process in all science classes not a one time or one course event.

Inherent in all science activities is the conveying of information. And, the most common form of conveying information is through writing. However, many students fear writing. This curriculum guide is intended develop expertise in writing while easing the fear of it. As science students engage in the suggested writing activities they will discover proficiency in writing because they will write about scientific and technical subjects. The student will discover that writing is an exercise in logic and that words are the tools to express this logic.

The structure of this curriculum guide is based on the following principles: students need models; revision is the key to successful writing; writing is a tool for demonstrating learning; writing is a tool for learning. Good teaching involves providing models. Just as a science teacher demonstrates concepts with concrete examples, (s)he will have to provide models of various writings. Some models are included in this guide, however, real life models, such as a letter to the editor, are readily available. Secondly, students must be required to revise their work. Imagine how many times Einstein revised the theory of relativity before it was published! Thirdly, writing is a tool for demonstrating learning and such written assignments should be evaluated. The evaluation may be self-evaluation, peer evaluation, teacher evaluation, or some combination of the three. Finally, writing is a tool for learning content and as such is personal, informal, and does not require teacher evaluation. This informal writing helps students discover what they know about a topic and develop further understanding of a topic.

In summary, the two driving principles of this curriculum are the beliefs that writing can be learned in science and that writing is a tool for learning science. The student outcomes are designed to address both principles during the student's four year period in the Coventry Science Center.

Regina G. Chatel, Ph.D.
1997

Writing To Learn In Science Philosophy

The Coventry Science Center views writing in science as thinking on paper. The process of writing improves critical thinking, deepens understanding of science content, develops collaborative learning skills, improves communication skills. Also, writing reinforces knowledge of scientific concepts, principles, and skills learned through reading, speaking, listening, viewing, and visually representing. Writing invites students to think about the content by revisiting their ideas. It fosters critical thinking through the process of generating, sorting and clarifying understandings and ideas. Writing extends student thinking beyond memorizing by engaging students in identifying, analyzing, categorizing, integrating, and evaluating content. The permanence of the written word invites reflection.

Writing in Science Outcomes Grades 9-12	**Writing in Science Assessment Grades 9-12**
The student will:	**The student will be able to:**
• write to discover and clarify thinking in science.	• maintain a portfolio which demonstrates progress, effort, and achievements in using a variety of informal 'writing to learn' activities in all science classes many include: reading journals, focused freewriting, summaries, peer dialogues, comprehension questions, graphic organizers.
• apply the writing process strategies of brainstorming, planning, composing, conferencing, revising, editing, and creating a final product.	• maintain a portfolio which demonstrates progress, effort, and achievements in using writing process strategies while writing to learn in science.
• write for different purposes, to different audiences, in a variety of forms in each of the types of writing: - expository/analytical - expository/persuasive - practical/informative - narrative/imaginative - descriptive/sensory	• maintain a portfolio which demonstrates progress, effort, and achievements in writing for different purposes, from different points of view, and in a variety of forms in science, including: essays, book reports, lab reports, editorials, stories, research reports, letters.
• use technology, including word processing, software, Internet, and email to gather, organize, compose and create final written products.	• maintain a portfolio which demonstrates progress, effort, and achievements in using technology to write final products in science.

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Reading/Writing Connection
Reading Comprehension
Theoretical Framework - Reader and Text Interactions

Defining Reading Comprehension is a basic component of literacy development which includes reading, writing, speaking, listening, viewing, and representing. **Writing** in science is a part of the bigger picture of **literacy** development in science. In order to facilitate student use of writing in science, both teacher and student must understand the different levels of reading comprehension. Students must read with comprehension in order to write meaningfully about the content. Students cannot write without at least some knowledge of the topic. However, comprehension is not a static, one dimensional process. Recent research in reading suggests at least four levels of comprehension or interaction with text: **Initial Understanding, Developing an Interpretation, Reader/Text Connections, Demonstrating a Critical Stance.** The successful science student processes information , written, visual, oral, kinesthetic, on all four levels.

International, national, and state assessment of students indicates that students are improving in the development of **Initial Understanding** of text not in the other three levels. Good readers also tend to be good writers. Therefore, the writing activities suggested in this curriculum support the reading and writing development on all four levels of comprehension.

Initial Understanding - These are the first ideas in the reader's mind in trying to understand the text. Since the reading is just finished, the ideas are relatively unexamined and newly formed. It is the reader's overall comprehension of the piece, a major event, character or concept, or the ending. The reader is gathering initial ideas about the text.

Developing an Interpretation - Reader reviews and rethinks ideas in the text in order to inspect, refine, and deepen initial understanding. Reader elaborates on their understanding by reviewing the text to consider relevant parts more closely or to explain implied or inferred meanings. Reader examines various perspectives or alternatives within the story, or the concepts, processes, arguments, or logic of an informative piece. Reader immerses self in the world of the text.

Reader/Text Connections - Reader connects ideas from the text with his/her own knowledge, understandings, and experiences. Reader responds to the text by taping into personal prior knowledge which facilitates understanding of the text. In addition, information gained from the text changes or adds to the reader's knowledge and expands the reader's understanding of oneself. Reader/text connections are characterized by a wide range of individual variability. Reader gains insight from the encounter with the text.

Demonstrating a Critical Stance - Reader distances him/herself from the text to examine, evaluate, or analyze the text itself or how it relates to other text, eras, cultures, content, processes, concepts, or opinions. Reader engages in critical evaluation of the text or application to commonplace events and practical tasks. Reader may also examine own understanding of the author's craft, purpose, or bias as well as the author's use of textual features, style, organization, text structure, literary elements, allusions, and language. Reader reflects on what the text means, how it works, and why.

Adapted from Langer, J. (1995). ***Envisioning Literature: Literary Understanding and Literature Instruction***. Newark, DE: International Reading Association/Teachers College Press.

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CAPT Writing Framework
Process of Writing

Generating Ideas (Prewriting)	Developing/Clarifying Ideas (Composing/Revising)	Proofreading
Requires the writer to select and limit topics, draw upon personal knowledge as well as other sources, set purposes, and define his or her audience.	Requires the writer to develop, clarify, organize, and support ideas; to rethink his or her writing; to make changes to improve content and form.	Requires the writer to assess a piece of writing in terms of accepted standards for paragraphing, sentence structure, and the mechanics of written English.
• What do I know about the topic? • Who is my audience and what do they know about the topic? • What do I want to accomplish with this piece of writing? • How should I organize my ideas? • Have I tried various strategies for generating ideas?	• Will my audience understand my ideas? • Have I expressed my ideas clearly? • Have I used words that are clear and expressive? • Have I fully developed and explained my ideas? • Have I supported the points I'm trying to make? • How can I improve this piece? • How can I organize my ideas effectively? • Are there new ideas I might include? • Are the length and structure of my sentences appropriate for my purpose? • Is this my voice? • Do I believe what I wrote? • Have I accomplished what I set out to do?	• Have I written in complete sentences? • Have I inserted paragraphs where they belong? • Have I employed correct punctuation, capitalization, spelling, and usage? • Have I used proper sentence construction? • Have I used appropriate transition words or phrases to complete a logical progression of ideas? • Can I clarify the meaning of a sentence by selecting a word or phrase that is clearer, more precise or logical?

• To Express Personal Ideas
• To Inform
To Persuade

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Writing in Science: Portfolio Assessment

Portfolio Development Guidelines
Formative Portfolio

Introduction

What is a portfolio? What is the purpose of the portfolio?! What should be included in a portfolio? How big should the portfolio be? All students and teachers ask these questions when they realize that they will be creating personal portfolios. A portfolio is defined as a purposeful collection of student work which exhibits the student's efforts, progress, and achievements in one or more areas. In addition, it must include student participation in selection of contents, designing the criteria for selection of contents and judging its merit, and evidence of student self-reflection.

What to Include in a Portfolio

Since a portfolio is done with a student not to a student, you and the students have to make many hard decision with respect to what to include in your portfolio. The list of what a portfolio might include is only limited by one's imagination. In the case of this portfolio, the student's choices are guided by the writing outcomes in this curriculum. In deciding what to include in the portfolio, consider the question of how the artifact might be addressing a writing outcome. The things that can be included should be selections from the chart labeled, **Writing in Science: Purposes and forms of Writing.**

Portfolio Structure

1. Title Page
2. Table of Contents
3. Portfolio Introduction
4. Goals/Objectives

- Students write periodic (quarterly, midsemester, or midyear)goals as they refer their effort, progress, and achievement of the Writing to Learn in Science Outcomes and Assessment .

5. Artifacts & Reflections

- Each artifact included in the portfolio must be accompanied by a self-reflection which explains what the artifact demonstrates about the students knowledge of science and how writing the piece influence the learning of the content.

6. Reflection: The following questions are intended to guide students in writing their self-reflections. Students are asked to consider the nature of the artifact, the learning it is demonstrating, and the role that writing played in the acquisition of the learning. Therefore, students are to think about:

- Why did you select this artifact?
- How did you benefit from this activity?
- How did this artifact help you achieve your objectives?
- How did this artifact influence your learning? thinking?
- How do you anticipate using this artifact in the future?

7. Yearly Summative Reflective Composition.

Each student writes a summative composition with respect his/her effort, progress, and achievement of the Writing to Learn in Science Outcomes and Assessment .

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Portfolio Table of Contents Guidelines

Writing in Science Outcomes Grades 9-12	Title of Works or Artifacts			
	Grade 9	Grade 10	Grade 11	Grade 12
The student will: • write to discover and clarify thinking in science:				
• apply the writing process strategies of brainstorming, planning, composing, conferencing, revising, editing, and creating a final product.				
• write for different purposes, to different audiences, in a variety of forms in each of the types of writing: • - expository/analytical • - expository/persuasive • - practical/informative • - narrative/imaginative • - descriptive/sensory				
• use technology, including word processing, software, Internet, and email to gather, organize, compose and create final written products.				

SAMPLE Portfolio Evaluation

A portfolio is a purposeful collection of student work that exhibits the student's efforts, progress, and achievements with respect to the course objective. The portfolio must include evidence of student participation in : selecting contents, the criteria for selection, and evidence of self-reflection.

Contents	4	3	2	1	Earned Points
Structure	Creative, captures readers attention; presented with title, table of contents, introduction, objectives; organized; professional.	Presented with title, table of contents, introduction, objectives; organized; professional.	Presented with title, table of contents, introduction, objectives. Unprofessional.	Presentation missing items.	1 X ____
Artifacts	Variety, including forms of writing, purposes for writing, works in progress, use of technology. Shows in-depth research and understanding of content.	Variety, including forms of writing, purposes for writing, works in progress, use of technology.	Little variety. Minimal relevance to student outcomes and course content.	Little variety.	3 X ____
Reflections	All reflections address objective(s), artifacts, and relevance to future applications. Evidence of risk taking and critical thinking.	All reflections address objective(s), artifacts, and relevance to future applications.	Reflections do not clearly address objective(s), artifacts, and relevance to future applications.	Reflections missing or in need of elaboration. display a lack of self-awareness.	2 X ____
Summative Composition	Each of the three points are fully addressed; writing is well composed; shows understanding of portfolio process.	Each of the three points are addressed; two are fully explained; one in need of elaboration.	Each of the three points are addressed; two in need of elaboration.	One or more points are not developed or addressed.	1 X ____

28-26=A; 25-24=A-; 23-22=B+; 21-19=B; 18-17=B-; 16-15=C+; 14-12=C; 11-10=C-; 9-7=D; 6 or less=F

Assessment Strategies

Analytic Scoring Rubric
CAPT Science Performance Task
Spring 1995

DIMENSION	SCORE
Problem Definition	
• The problem is stated clearly. Clear identification of independent and dependent variables.	3
• The problem is stated adequately. Adequate identification of independent and dependent variables.	2
• The problem is poorly stated. Poor identification of independent and dependent variables.	1
• The statement o the problem is very limited or missing. No identification of independent and dependent variables.	0
Experimental Design	
• The experimental design matches the stated problem. Variables are controlled. The procedures are clear, complete, and replaceable. A control is included when appropriate.	3
• The ex experimental design generally matches the stated problem. Attempt at controlling variables is made. Procedures are generally complete. Minor modifications or clarifications may be needed.	2
• The experimental design matches the stated problem to some extent. Little attempt to control variables. Procedures are incomplete. Major modifications or clarifications may be needed.	1
• The experimental design does not match the stated problem, is very incomplete or missing. No attempt to control variables.	0
Data Presentations	
• Data are accurate, complete, well organized and presented in an appropriate manner.	3
• Data are generally accurate, complete, organized and presented in an appropriate manner. Minor errors or omissions my be present.	2
• Data are somewhat inaccurate, incomplete, poorly organized or presented in an inappropriate manner. Major omissions or errors may be present.	1
•	
• Data re highly inaccurate, incomplete, poorly organized or presented in an inappropriate manner or missing altogether.	0
Conclusions	
• Conclusions are related to the stated problem and fully supported by data. Validity of conclusions is thoroughly discussed.	3
• Conclusions are generally related to the stated problem and supported by data. Minor errors in interpretation of results may be present. Discussion of validity of conclusions is limited.	2
• Conclusions are related to the stated problem and supported by data to a limited extent. Major errors in interpretation of results may be present. Little discussion of validity of conclusions.	1
• Conclusions are not related to the stated problem, not supported by data or are missing. No discussion of validity of conclusions.	0

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Focused Holistic Scoring Rubric
CAPT Science Performance Tasks
Spring 1995

Excellent Performance
The response reflects excellent problem solving and science process skills. The problem is clearly stated. The independent and dependent variables are clearly identified. The experimental design matches the stated problem. Variables are controlled. All procedures are clear. complete and replaceable. A control is included when appropriate. Data are accurate, complete, well organized and presented in an appropriate manner. Conclusions are related to the stated problem and fully supported by data. Validity of conclusions is thoroughly discussed.

Proficient Performance
The response reflects proficient problem solving and science process skills. The problem is adequately stated. The independent and dependent variables are adequately identified. The experimental design generally matches the stated problem. An attempt at controlling variables is made. Procedures are generally complete. Minor modifications or clarifications may be needed. Data are generally accurate, complete, organized and presented in an appropriate manner. Minor omissions or errors may be present. Conclusions are generally related to the stated problem and supported by data. Minor errors in interpretation of results may be present. Discussion of validity of conclusions is limited.

Marginal Performance
The response reflects marginal problem solving and science process skills. The problem is poorly stated. The independent and dependent variables are poorly identified. The experimental design matches the stated problem to some extent. Little attempt at controlling variables is made. Procedures are incomplete. Major modifications or clarifications may be needed. Data are somewhat accurate, incomplete, poorly organized and presented in an inappropriate manner. Conclusions are related to the stated problem and supported by data to a limited extent. . Major errors in interpretation of results may be present. Little discussion of validity of conclusions.

Unsatisfactory Performance
The response reflects unsatisfactory problem solving and science process skills. The statement of the problem is limited or missing. The independent and dependent variables are not identified. The experimental design does not matches the stated problem, is very incomplete or missing. No attempt to control variables. Data are highly inaccurate, incomplete, poorly organized or presented in an inappropriate manner or missing altogether. Conclusions are not related to the stated problem, not supported by data or missing. No discussion of validity of conclusions.

Expository Writing Rubric

Student Name _____ Date _____

Title of Work _____

A. The essay maintains focus on the subject or topic. _____

3 = maintains focus
2 = moderate focus
1 = minimal focus
0 = lack of focus

B. The essay exhibits appropriate organization which includes a beginning, middle and ending. _____

3 = contains all three components
2 = contains two components
1 = contains one component
0 = lacks overall organization

C. The essay develops in a logical sequence. _____

3 = maintains sequence throughout
2 = moderate sequencing
1 = minimal sequence
0 = lack of sequence

D The essay is developed with appropriate elaboration and supporting details. _____

3 = full elaboration and support
2 = moderate elaboration and support
1 = minimal elaboration and support
0 = lack of elaboration and support

E. The essay maintains a consistent voice (first or third person). _____

1 = maintains a consistent voice
0 = lacks a consistent voice

Total Points Achieved _____
Total Points Possible __13_

Percentage Score _____

Writing in Science

Writing In Science: Possible Forms of Discourse

- Advice columns
- Advertisements
- Announcements
- Applications
- Biographical sketches
- Brief descriptions
  - of places/settings
  - of ideas specific to content
  - of historical or current events
- Brochures
- Cartoons
- Case studies
  - school problems
  - local, state, national concerns
  - scientific issues
  - environmental issues
- Character sketches
- Children's books
- Collage, montage, mobile
- Commercials
- Demonstrations
- Dialogues and debates
- Dramatic scripts/plays/vignettes
- Eulogies
- Feature stories
- Future possibilities: careers, school
- Games & puzzles
- Guess who/what descriptions
- Historical "you are there" scenes
  - past, present, future
- Innovations on text
- Instruction manuals
- Interviews
- Inquiries
- Jokes & riddles
- Journals, diaries
  - real or imaginary
- Letters
  - complaint
  - personal reaction
  - observation
  - persuasive
    - to editor
    - to public at large
    - to public officials
    - to other students
    - to parents
  - to/from imaginary/future audience
- Limericks
- Math problems
  - story problems
  - solutions to problems
  - record books
  - notes and observations
- Mottoes & slogans
- Newspaper stories
- Parodies
- Petitions
- Poems
- Poster displays
- Prophesy & predictions
- Proposals
  - utopian, practical
- Protests
- Puzzles & word searches
- Oral histories
- Rebuttals
- Recipes
- Requests for information
- Reviews
  - books, including textbooks
  - films
  - outside reading
  - television specials
  - documentaries
- Scientific abstracts
- Science notes
  - reading reports
  - lab reports
  - observations
- Scripts, skits, puppet shows
- Songs, ballads
- Stories and anecdotes
  - as told by others
  - from personal experience
  - science fiction
  - historical
- Town meeting
- Technical manuals: how to, school guide, survival
- Technical reports
- Tall tales
- Telegrams
- Time capsule lists
- Video presentations
- Word problems

Adapted from

Broza, W. G. & Simpson, M.L. (1995). **Readers, Teachers, Learners: Expanding Literacy in Secondary Schools.** Englewood Cliffs, NJ: Merrill, PrenticeHall

Vacca, T.R. & Vacca, J.L. (1986). **Content Area Reading.** Boston, MA: Little, Brown and Company

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Writing In Science: Purposes & Forms of Writing

Type	Purpose	Forms
Expository/Analytical	• to explain, analyze; usually in essay form	Book reports Debates Dialogue to persuade Editorial Letter to the editor One paragraph essay with topic sentence & supporting details Multiparagraph essay/theme describe/conclude analyze/conclude analyze/persuade define classify defend a decision interpret literature Speech Research Report Review a book, movie, documentary
Expository/Persuasive	• to persuade • make a point • convince someone about an idea, or debate one side of an argument or issue • may be factual or fictional • may contain emotional appeal • must attend to needs and concerns of audience	Advertisement Bumper sticker Cartoon Essay Flier Letters to editor, community leaders, parents, teachers, etc. Lists of reasons why_____ Report Research Paper
Practical/Informative	• to present information unambiguously	Accident reports Applications Business letters complaints orders requests for information Class notes Commercials Direction manuals Directions to complete a task Friendly notes for various purposes Lecture notes News reports Newspaper articles News scripts Self-evaluations Scientific Abstracts Summaries

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Type	Purpose	Forms
Narrative/Imaginative	• to tell what happens, real or imaginary • to engage in the art of story telling • to put into a sequence	Allegories Diary entries; real, fictional Dramatic scripts Captions for cartoons, pictures Dialogues Folk tales Journal entries; real, fictional Monologues Myths Plot outlines Stories Tall tales Vignettes
Descriptive/Sensory	• to describe in vivid detail • to express individual feelings • to observe an record one's surroundings precisely	Advertisements Character sketches Dialogues Diary entries Personal letters Poems; acrostic, cinquain, haiku, prose

Instructional Strategies

Instructional Strategy

Lab Report Write - up Procedures

All lab reports must be written using the following procedures:

1. **Title**
   A statement about the laboratory or investigation.

2. **Statement or Purpose of the lab or activity.**
   Write specifically what you are trying to accomplish. The statement can be in the form of a hypothesis.

3. **Procedures Followed and Materials Used.**
   This needs to include a step-by-step description of how the activity was conducted, including the materials used. The procedures should be clearly stated and reproducible.
   - List book title and page number.
   - Write any variations from the procedure in the book.
   - If applicable, describe the dependent and independent variables in the lab.
   - A control should be included where applicable.

4. **Data, Observations, and Results.** All data must be recorded in a neat, clear, and concise form.
   - Data includes measurements taken during the laboratory which are logically sequenced and organized into charts, graphs, and tables.

   Data should reflect both qualitative and quantitative aspects.

5. **Calculations.** Write out all calculations showing all work, equations used, and labeling values correctly.

6. **Questions.** Write out the answers to any lab questions in complete sentence.

7. **Summary.** Write an explanation of your lab results.
   - State what was discovered/learned during the lab.
   - Comment on the validity of your results.
   - Discuss the factors that may have affected your lab results.
   - All conclusions should relate to your original statement of problem and fully supported by data.
   - Should not be a restatement of the data.
   - Be specific!

Instructional Strategy

Expository Essay

Introduction

These directions for writing an expository essay are applicable to everything from answering the questions at the end of chapter in a textbook, to writing essays on a test, and the typical one, three, five, or more paragraph essays. The major point of the Expository Essay is that it explores and expresses ideas on an issue. One way for students to think about the format of the Expository Essay is that the Introduction establishes the focus of the work, the Body develops the focus, and the Conclusion recaps the introduction or initial point. It must requires:

- **planning and research**
- **clarity expression of ideas & logical arguments**
- **accurate details in support of generalizations or main ideas**
- **ideas prioritized in order of importance**
- **typically, a sound expository essay exhibits the 'three deep' concept which establishes the writers authority**

The Essay

Introduction

The first paragraph tells the reader the author's approach to the issue or topic. It must be clearly and precisely stated and capture the reader's attention. In other words, it tells the main idea and describes the topic.

Body or Development

Following the news writing format, the body of the Expository Essay should develop points made in the introduction in a logical order. All points should be in order of importance, starting with the most important first.

Each point is best developed in a separate paragraph, therefore, the Expository Essay does not have a specific number of paragraph but depends on the introduction to determine the number of points to be discussed. Each paragraph develops one idea giving all the pertinent information. It is best to be concise and not preach! In order to keep the reader interested, the writer needs to vary sentence length and construction. Paragraphs must be linked in order to maintain fluency. Basically, there are five organizational patterns for the Expository Essay:

Pattern	Transition or Linking Words
1. Descriptive	Characteristics are; For example
2. Sequence	First; Second; Third; Next; Then; Finally
3. Comparison/Contrast	Different; In contrast; Alike; Same as; On the other hand
4. Cause/Effect	Reasons why; If...then; As a result; Therefore; Because
5. Problem/Solution	Problem is; Dilemma is; Question..Answer

Conclusion

Writer briefly recaps the initial points. The goal is to convince the reader of the soundness of ones reasoning. A strong conclusion might be summed up with: *Consequently, As a result, Therefore, In conclusion*

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Instructional Strategy

Three Paragraph Expository Essay Format

Introductory Paragraph
Although construction of the first paragraph will vary, the following sentences/points should be included.

The **First Sentence** tells what the essay will be about. This is your opportunity to hook the reader. Please refer to the example to help you formulate your opening paragraph.

The **Second Sentence** identifies the part or point you have chosen to discuss in the essay.

the **Third Sentence** briefly explains why you think this point is very important.

"It is important because

Body or Development
This paragraph(s) fully elaborates and explains your reasons. This is the time to remember the **'three deep'** concept. Try to give at least three reasons in support of you point of view.

" The first reason I think _____ is important is because _____."
"Secondly, it is significant because _____ _____."
"As this example illustrates _____."
"Thirdly, because _____."
"The following example demonstrates _____ _____."
"Finally, _____."

Conclusion or Closing Paragraph
Your opportunity to impress the reader with your major point(s). The reader will remember a strong conclusion.

"In conclusion, _____."

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Instructional Strategy

Book Report Format

Students are required to read a **nonfiction** book related to:

_____
(determined by teacher & students in a given course)

Book must have prior approval of teacher.

Contents of Book Report

- Title, author, and copyright date which is very important for nonfiction books in that it helps you determine if you are reading current or historical information.

- First paragraph (1/2 to 3/4 page) briefly states what the book is about.

- Second paragraph (1/2 to 3/4 page) tells:
  - what you learned from this book
  - what was most interesting in the book
  - briefly explains one or two things that you found very significant in that it is what you'll remember from the book because it made the greatest impression on you.

Due Date - Tomorrow!!

The report may be handed in without penalty up until the beginning of class on _____ . There will be no acceptable excuses for it being handed in after that time.

Students have tried (unsuccessfully) the following excuses:

- My dog ate it.
- My little sister drew on it.
- The bus ran me over on the way to school.
- I'm in the hospital having brain surgery.

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Contrast Frame

_____ and _____ are different in several ways.

First, _____ is _____, while _____

is _____. Secondly, _____ but _____.

Thirdly, _____ while _____. Finally,

_____ is _____, while _____.

Sequence Signal Words

after	*previously*
before	*prior*
earlier	*later*
follows	*subsequently*
next	*first, second, third...*
then	*precedes*

Sequence Frame

This is the process for making _____.

First, _____.

Second, _____. Next,

_____. Then, _____

_____. Finally, _____

_____.

Cause/Effect Signal Words

because	*since*
in order to	*causes*
affects	*as a result of*
consequently	*therefore*
so	*leads to*
produces	*results in*
Due to	

Cause/Effect Frame

Due to _____,, _____

and _____ caused _____.

_____. Consequently,

_____. Finally, as a result, _____

_____. This helps explain why ,_____

_____.

Instructional Strategy

Dialogue Journals in Science:
The Reading Writing Connection

Dialogue journals are an effective means of developing rather than simply assessing reading comprehension. **Since writing** is a part of the bigger picture of **literacy** development in science, journals helps students to learn the content they are reading by processing it in writing in the journal.. Comprehension is not static nor one - dimensional. Recent research in reading suggests at least four levels of comprehension or interaction with text: **Initial Understanding, Developing an Interpretation, Reader/Text Connections, Demonstrating a Critical Stance.** The following journal structure will help students understand the text on a variety of levels.

Assessment: When using dialogue journals, the teacher need not read every entry, instead: a selected number of journals may be read weekly; students may exchange journals for peer evaluation; students may designate one journal entry per week, unit, semester, etc. to be evaluated for credit or grade. The focus should be on the ideas rather than the mechanics.

Below are three Alternative Dialogue Journal formats. the teacher and students are invited to modify these as need be.

Alternative I

Dialogue Journals	
Initial Understanding	**Developing an Interpretation**
Possible questions or dialogue: **Getting the Gist of Reading** **• What's on your mind right now?** ***(Describes the text.)*** **• What did you think when you finished reading?** ***(Describes new learning.)*** **• Is anything bothering you about the piece?** ***(Makes inferences.)*** **How did the author organize his/her ideas?** ***(Describes the text.)***	**Possible questions or dialogue:** **• How do the ideas in this text relate to what you know about the topic?** ***(Connects new information with prior knowledge.)*** **• What are the causes of the problem?** ***(Identifies and analyzes problem.)*** **What is the best solution on the given information?** ***(Predicts solution or outcome.)***

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Dialogue Journals in Science
Alternative II

Dialogue Journals		
Initial Understanding	**Developing an Interpretation**	**Reader/Text Connections**
Possible questions or dialogue: **Getting the Gist of Reading** *** What's on your mind right now?** ***(Describes the text.)*** *** What did you think when you finished reading?** ***(Describes new learning.)*** *** Is anything bothering you about the piece?** ***(Makes inferences.)*** **How did the author organize his/her ideas?** ***(Describes the text.)***	**Possible questions or dialogue:** *** How do the ideas in this text relate to what you know about the topic?** ***(Connects new information with prior knowledge.)*** *** What are the causes of the problem?** ***(Identifies and analyzes problem.)*** **What is the best solution on the given information?** ***(Predicts solution or outcome.)***	**Possible questions or dialogue:** *** How does this text remind you of other things you have read?** ***(Makes connections to other works.)*** *** What does the author say about the nature of people or science?** ***(Recognizes broader themes.)*** *** Should this story be considered good literature?** ***(Takes a personal stance.)*** *** How did this information change your idea of _____?** ***(Recognizes impact of text on personal beliefs.)*** **Does this information fit what you know about _____? Why?** ***(Makes connections to other works.)***

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Dialogue Journals in Science
Alternative III

Dialogue Journals		
Initial Understanding	**Developing an Interpretation**	**Demonstrating a Critical Stance**
Possible questions or dialogue: *** What's on your mind right now?** ***(Describes the text.)*** *** What did you think when you finished reading?** ***(Describes new learning.)*** *** Is anything bothering you about the piece?** ***(Makes inferences.)*** **How did the author organize his/her ideas?** ***(Describes the text.)***	**Possible questions or dialogue:** *** How do the ideas in this text relate to what you know about the topic?** ***(Connects new information with prior knowledge.)*** *** What are the causes of the problem?** ***(Identifies and analyzes problem.)*** **What is the best solution on the given information?** ***(Predicts solution or outcome.)***	**Possible questions or dialogue:** *** Are the ideas in this text important? Why or why not?** ***(Judges validity/significance of message/ideas.)*** *** How effectively did the author convey his/her ideas?** ***(Evaluates quality of author's craft.)*** *** How can you use the information in the future?** ***(Identifies future applications of information.)*** *** Why should the reader believe or not believe the author?** ***(Judges validity of author.)***

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Instructional Strategy

Pop - up Book: Chemistry in Daily Living
Note! Although this is an example for Chemistry, the same ideas may be applied to any other science course or topic.

All the pages are compiled into a class book which can serve as a culmination of a unit of study, as an introduction to the unit for subsequent years, or be shared by your students with a younger group of students as a cross-grade level collaboration.

An Invitation To Participate
Chemistry is a part of everyone's life. As a member of the world community who uses and is dependent upon technology, you must be cognizant of many scientific concepts and consequences in your daily life. The focus of our pop-up book is to explore the many ways our life is intertwined with concepts and consequences in Chemistry.

Please consider--Chemistry is the study of substances in our world---from the sugar you put on your cereal in the morning to the baking soda you use when making cookies to the water you drink to the propane you use for energy.

- What are substances made of?
- How do they act and interact with each other?
- How are they affected by energy such as heat or electricity?
- What are their roles in living things?
- What applications of Chemistry can you observe in your own life? in school? at home? in your garage? in your bedroom?

Chemistry in Daily Living: Guidelines for Page Proposals

Working with a peer, please write a brief description of your plans for a page in the Chemistry pop-up book. Be sure to address the concept and the model which will comprise your portion of the text.

An effective description will contain the following:

Concept - synthesis of concept which includes explanation of the chemical principle in accurate terms understandable to a student in Gr. 4-6.

Be sure to provide a definition of the concept and explanatory data.

Model or Pop-up - description of the model which are planning to construct in order to illustrate your concept.

Please be certain that your model illustrates clearly the chemical principle you have described in the text.

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Chemistry in Daily Living

Evaluation Rubric

Directions: Please evaluate the completed page using the following criteria.

	Excellent	Satisfactory	Poor
Concept Development			
* Concept defined	____	____	____
* Explanatory data	____	____	____
* Illustrations	____	____	____
* Audience awareness	____	____	____
Model or Pop-up			
* Illustrative of concept	____	____	____
* Creative	____	____	____
* Representative of Daily Living	____	____	____

Name _____ **Date** _____
(Self-Evaluation or Teacher)

Chemistry in Daily Living

Evaluation Rubric

Student Name _____ Date _____
Team Members _____
_____
_____

Directions: Please evaluate your individual and your team effort and success on this project.

	Excellent	Satisfactory	Poor
Cooperation within team			
I cooperated with others	___	___	___
Others cooperated with me	___	___	___
Comments_____			
_____			
Participation			
My personal participation was	___	___	___
My team members' participation was	___	___	___
Comments_____			
_____			
Coaching/Encouragement			
I coached and encouraged others	___	___	___
Others coached and encouraged me	___	___	___
Comments_____			
_____			
Timely completion of Project			
I completed my project on time	___	___	___
Team completed the project on time	___	___	___
Comments_____			
_____			

What did you learn about group work from this activity, with respect to yourself and to your peers?
Comments_____
_____

Instructional Strategy

Life Science Riddles

Adapted from an activity by C. Gilles

Introduction

This writing activity gives students an opportunity to summarize their knowledge about a given topic, unit of study, concept or idea. The focus is on the demonstrating ones knowledge of the content as well as proficiency in writing. In this example, students create a riddle to summarize their learning about "life in a pond." Although the example is simple, the clues students create may be complex depending upon the topic, intended audience for the riddle, and grade level of the students.

Procedure

After studying the animal and plant life in and around ponds, students pick an organism they are interested in. Each student writes a riddle describing the plant or animal in the first person. Each line contains a new and more descriptive clue. Clues can relate to the kingdom, phylum, how the animal looks, breathes, eats, moves, reproduces, its enemies, benefits or dangers to people.

Riddle can be exchanged with partners to guess; read to the entire class to guess; or exchanged with other classes.

Riddles can be compiles into a class book which can serve as a unit review or as an introduction to the unit of subsequent years.

Riddles can be used as a review for a test.

Riddles can be used to reinforce classification skills in that students can group them by characteristics.

Example of a life science riddle

I am in the animal kingdom;
I am in the vertebra phylum;
I am usually green, but I can be olive or black;
I breathe with lungs;
I eat toads, frogs, and insects;
I lay eggs, sometimes as many as 80;
I move very quickly; I am hard to catch;
King snakes and black snakes eat me;
I am helpful to people because I can eat gophers and young squirrels which might eat crops.
What am I?
(Garter snake)

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Instructional Strategy

Descriptive Writing: Observations of Nature

Students are asked to bring in a favorite nature photograph which will be published in a collection of photographic essays reflecting the natural beauty and wonder of Coventry. Or, students and teacher may engage in a photographic journey (field trip) of Coventry in order to document its natural beauty. An alternative way to acquire photographs night be to request them of the faculty and student body at large.

Once there is a sufficient number of photographs, students must create brief description or captions to accompany each photograph. This collection may then be compiled into a class book.

Procedures for Writing the Caption (Description)

Brainstorming or Gathering Ideas

An effective description creates a picture in the readers mind. In order to do this, the writer must use realistic details, colorful and exacting language, and vivid similes and metaphors. As you write your description, think about the following:

* What can you tell about the climate from this picture?
* What can you tell about the presence of wildlife from this habitat?
* What do you think the wildlife uses for shelter and food?
* What can you tell about the environment from this picture?
* What can you say about pollution from this picture?
* Does the picture invite the reader/viewer to "wander" the landscape?
* What scientific terms come to your mind when looking at the picture?

Write a rough Draft

Write a draft caption for your photograph using the precise and vivid images and language you brainstormed in the above activity. When using scientific terms be sure to explain them in simple language understandable to the general reader.

Conferences

It is understood that one's first work is a rough draft which will require some revision and editing. One way to do this is to place all of the photographs in one central area (mount on a bulletin board, if whole class) and students read their captions. While a student is reading the caption/description, the rest of the class tries to determine which picture is being described. In addition, students are invited to suggest other ideas which the writer might incorporate into the caption in order to make it more descriptive and vivid. Two students should be designated to take notes on the classes' suggestions so that feedback can be used for revision.

An alternative to the class conference might be to mount the photographs and the accompanying draft captions for student input as time allows during the day (week). At the end of the designated period, students revise the captions using the feedback made by peers.

Final Copy

Students revise and edit the final copy of the caption/description and submit it for inclusion in the class book (publication).

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Instructional Strategy

Business Letters

Science students may be engaged writing business letters for a variety of purposes and to many different audiences, for example: tellers to the editor, parents, legislators, school administration, governmental agencies, and businesses.

The following generic business letter format is intended to assist students in teachers in creating and evaluating effective business letters.

Planning Your Business Letter

It is suggested that students attend to the following suggestions when planning a business letter.

1. Determine and describe your purpose. Are you requesting information? Are you requesting specific actions be taken? Are you ordering or returning merchandise? Are you requesting a speaker to come to your class or school?

2. Clarify your audience. Keep in mind to whom you are writing. What does the audience already know? What does the audience need to know? What counter points should you raise and defuse?

3. Think about your choice of words. In keeping with the business tone of the letter, be reasonable, courteous, and avoid the use of colloquialisms and slang.

4. Gather information and plan your letter. Make notes of what you want to say. Include all the information necessary to explain the situation. Don't assume the reader will understand the matter.

5. Be concise! Eliminate unnecessary information. However, do not leave out important details. The goal is to be clear and to the point!

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Business Letter Format

Return Address	Street City, State ZIP
Date	Date
Inside Address	Person's Name Company Name Street City, State ZIP
Greeting	Dear _____ :
Body **Introduction**	_____ _____ _____ _____ _____ _____ _____ _____
Body	_____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____
Conclusion	_____ _____ _____
Complementary Closing	Sincerely,
	Signature

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